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Quality assessment of newly introduced genotypes of European radish (*Raphanus sativus* L)

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ABSTRACT

Thirty five diverse genotypes of European radishes procured from Crop Genetic Resources (CG) – the Netherlands and India, including two checks were evaluated for yield and quality characteristics. Analysis of variance showed highly significant differences among genotypes for all the characters under study. Genotype CGN-17290 gave 50.94 per cent more yield over check White Icicle and also performed better for other characters. Genotype CGN-23811, CGN-11997 and CGN-11994 performed better than both the checks for total soluble solids, ascorbic acid and total sugar, respectively. On the basis of results obtained in the present investigations, it was concluded that CGN-17290 proved as the best genotype followed by CGN-23811, CGN-11997 and CGN-11994 in yield and quality characters.

Keywords : Radish, genotypes, yield, quality.

INTRODUCTION

Radish (*Raphanus sativus* L) is a popular root crop grown all over the world. In India, it is grown in one or the other part of the country throughout the year. It is grown for its young fleshy tuberous roots and hypocotyles, consumed mainly as a salted vegetable, eaten as grated radish, garnish and salad. Besides roots and green leaves, its immature pod usually called Mongra is eaten raw and also cooked as vegetable. Radish is a cool season crop and divided broadly into two groups; European or temperate and Asiatic or tropical. Asiatic types produce roots and seeds under tropical climate, whereas, European types produce roots under temperate and tropical climate. However, seed production of European types is possible only under temperate conditions in hills since these require chilling temperature for seed production. The Asiatic varieties although are higher yielders yet poor in quality attributes, whereas, European varieties are small in size, mild in pungency, early in maturity and rich in quality parameters (Park and Kim 1985).

Himachal Pradesh is endowed with temperate type climatic conditions which are quite suitable for carrying out the breeding

and seed production of temperate types of radish. So far, there are only few temperate radish varieties released with good quality characters which are accepted for cultivation by the farmers. Keeping in view the above facts, the present study has been contemplated to evaluate the performance of newly introduced temperate genotypes for yield and quality characters. The superior genotypes can be developed either by selection or hybridization which may be promoted as an alternative to the existing ones.

MATERIAL AND METHODS

The present investigations were carried out at the experimental farm and laboratory of the Department of Vegetable Science, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan situated at an altitude of 1260 m amsl, latitude 30°152 North and longitude 77°112 East during 2008-09. The climate of the experimental farm was generally sub-temperate, semi-humid characterized by cold winters with mild summer and moderate rainfall. The experimental material comprised of 35 diverse genotypes of European radish in which 33 genotypes were introduced from the Crop Genetic Resources (CGN), the Netherlands and two check varieties viz RRWT and White Icicle of Dr Y S Parmar University of Horticulture and Forestry. The experiment was laid out in randomized block design with three replications. The seed sowing was done in the month of September, 2008 at a spacing of 30 x 10 cm in a plot size of 1.5 x 1.0 m accommodating 50 plants per plot. The standard cultural practices for the crop were followed. The observations were recorded on ten randomly selected plants in each replication for yield and various quality characters viz dry matter (%), total soluble solids (°B), ascorbic acid (mg/100 g), total sugar (%) and crude fibre (%). For dry matter estimation, the roots harvested in each treatment were thoroughly cleaned and one kilogram of fresh roots were drawn from each genotype. Those roots were washed in running tap water and then oven-dried at 65 + 5°C till a constant weight. The dry matter was expressed in percentage. Total soluble solids, ascorbic acid, total sugar and crude fibre were calculated as per the method suggested by Ranganna (1986), AOAC (1980), Dubois et al (1951) and Sankaram (1966), respectively. All the data pertaining to root and quality characters were analyzed as per randomized block design. Analysis of variance (ANOVA) was calculated as explained by Gomez and Gomez (1983). The treatments mean were tested at 5 per cent and/or 1 per cent level of significance.

RESULTS AND DISCUSSION

The observations recorded on average root weight, yield (average root weight converted into yield per hectare) and various quality characters viz dry matter, total soluble solids (TSS), ascorbic acid

contents, total sugar and fibre content after analysis are presented in Table 1. It is evident form the data that significant differences among genotypes were observed for all the characters under study. Highly significant variations were recorded for average root weight. The difference between the genotypes for this character ranged between 7.00-36.09 g. The maximum average root weight was found in CGN-17290 (36.09 g) and minimum (7.00 g) in genotype CGN-07291. The overall average root weight of the population was 12.19 g. Maximum average root weight (36.09 g) was observed in genotype CGN-17290 and gave 50.94 per cent more yield over check cultivar White Icicle. Per cent dry matter recovery of the genotypes ranged between 3.52-5.50 per cent. Maximum dry matter content (5.50%) was recorded in CGN-17290.The grand mean of the genotypes for this trait was 4.46 per cent. Total soluble solids (TSS) revealed significant variation among genotypes. The difference of mean values ranged from 1.13-8.23 ^{o}B. It is evident from the data that TSS as high as 8.23 ^{o}B was observed in genotype CGN-23811. The lowest value (1.13 ^{o}B) for this trait observed in CGN-23469 was statistically at par with CGN-07289 (1.23 ^{o}B) and CGN 14004 (1.40 ^{o}B). The overall TSS of the population was 3.07 ^{o}B. The ascorbic acid content showed significant variation among the genotypes. The comparison of mean value of genotypes ranged from 4.79-45.71 mg/100 g. The genotype CGN-11997 had maximum content (45.71 mg/100 g) and minimum (4.79 mg/100 g) in genotype CGN-22078. The overall mean value of the population was 28.74 mg/100 g. The Total sugar ranged from 0.15-1.51 per cent. The comparison of mean value for genotypes revealed that highest total sugar was found in genotype CGN-11994 (1.51%). The overall mean of population for this character was 0.96 per cent. Maximum fibre content (0.56%) recorded in genotype CGN-07291 was found statistically at par with CGN-14004 (0.55%). Minimum fibre content (0.12%) was found in genotype CGN-17290. The overall value for this character in the population was 0.34 per cent. Wide range of variation for different quantitative and qualitative characters in different genotypes of temperate radish have been reported by Pujari et al (1977), Ponnuswami et al (1982), Khan et al (1983), Panwar et al (2003), Singh and Taj (2005) and Singh et al (2005). The genotype CGN-17290 requires further testing to be released as a substitute to already released ones, whereas, CGN-23811, CGN-11997 and CGN-11994 recorded higher TSS, ascorbic acid and total sugar, respectively. These genotypes can be involved in further breeding programmes for improving quality attributes.

Table 1. Mean performance of different European radish genotypes for quality traits

Genotype	Average root weight (g)	Converted root yield/ha (q)	Dry matter (%)	Total soluble solids (°B)	Ascorbic acid (mg/100 g)	Total sugar (%)	Fibre conent (%)
CGN-06943	8.37	27.87	3.81	3.40	23.83	0.56	0.47
CGN-06945	11.80	39.29	4.60	2.20	25.93	1.01	0.22
CGN-07289	10.40	34.63	4.30	1.23	25.87	0.76	0.32
CGN-07291	7.00	23.31	3.52	2.37	28.35	0.99	0.56
CGN-07292	9.78	32.57	4.18	3.77	26.23	1.04	0.36
CGN-11994	16.00	53.28	5.30	4.20	36.60	1.51	0.20
CGN-11996	8.30	27.64	3.75	3.13	32.85	1.05	0.50
CGN-11997	9.23	30.74	3.77	2.33	45.71	1.22	0.42
CGN-14004	8.10	26.97	3.69	1.40	24.37	0.64	0.55
CGN-14009	8.60	28.64	3.80	2.23	22.60	0.78	0.47
CGN-14010	8.82	29.37	4.02	2.17	25.66	1.04	0.48
CGN-14012	12.23	40.73	4.80	4.27	26.42	1.23	0.22
CGN-14015	12.42	41.36	4.93	2.23	32.20	0.72	0.26
CGN-14016	11.40	37.96	4.34	2.57	27.37	1.08	0.30
CGN-17267	9.51	31.67	4.18	3.27	32.41	1.00	0.37
CGN-17269	8.70	28.97	3.86	2.10	37.08	0.91	0.45
CGN-17270	10.55	35.13	4.23	2.30	30.13	0.41	0.36
CGN-17286	12.83	42.72	5.00	3.03	28.74	0.91	0.30
CGN-17287	9.62	32.03	4.13	3.50	32.30	1.34	0.39
CGN-17288	13.00	43.29	5.04	3.87	37.57	1.26	0.22
CGN-17289	12.68	42.23	4.86	3.07	27.88	1.02	0.24
CGN-17290	36.09	120.18	5.50	3.47	36.23	1.04	0.12
CGN-22070	10.97	36.53	4.31	2.90	34.96	1.37	0.30
CGN22072	12.78	42.56	4.95	2.83	32.35	0.59	0.23
CGN-23465	10.71	35.66	4.41	2.17	37.00	1.04	0.33
CGN-23466	10.40	34.63	4.34	2.00	38.95	1.22	0.31
CGN-23469	11.83	39.39	4.72	1.13	27.67	1.12	0.25
CGN-23809	9.48	31.57	4.03	2.10	33.90	0.94	0.42
CGN-23810	9.56	31.83	4.09	2.40	28.79	0.43	0.42
CGN-22067	22.50	74.93	5.40	4.00	15.51	0.71	0.18
CGN-22071	9.71	32.33	4.30	4.43	15.89	1.09	0.36
CGN-22078	8.78	29.24	3.89	3.97	4.79	0.15	0.48
CGN-23811	14.33	47.72	5.18	8.23	28.29	1.05	0.27
White Icicle	23.91	79.62	5.40	4.87	20.35	1.31	0.19
RRWT	16.30	54.28	5.31	4.23	21.10	0.93	0.21
Range	7.00-36.09	-	3.52-5.50	1.13-8.23	4.79-45.71	0.15-1.51	0.12-0.56
Mean	12.19	-	4.46	3.07	28.74	0.96	0.34
SE(d) +	0.20	-	0.08	0.14	0.65	0.01	0.01
$CD_{0.05}$	0.40	-	0.08	0.28	1.29	0.02	0.02

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